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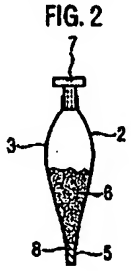
(54) Abstract Title
Foamed drinks made using a capsule with a foamable ingredient

(57) The preparation of a foamed drink such as cappuccino coffee or frothy hot chocolate by providing a capsule or sachet containing a foamable ingredient such as powdered milk 6 and having an outlet for allowing fluid to escape from the capsule and providing a receptacle 17 positioned to collect fluid escaping from the capsule through the outlet. Liquid such as hot water at 90° C is injected via tube 15 into the capsule to mix with the foamable ingredient thus allowing the foamable ingredient mixed with the liquid to escape through the outlet into the receptacle. This can be accomplished by having the capsule bonded on its lower margin 5 by adhesive 8 which is released by the action of hot water inside the sachet. Further liquid is then injected into the receptacle through a jet 12 having a jet diameter of from about 0.5 to about 2 mm to produce foamed liquid in the receptacle. The invention also provides brewing equipment specifically adapted for use in the method.

FIG. 2



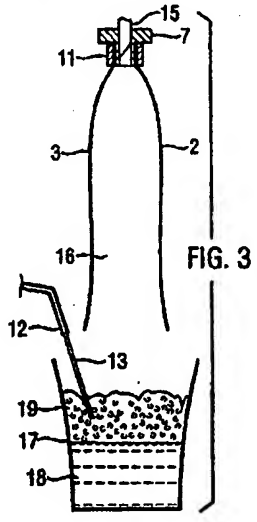


FIG. 3

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FIG. 1

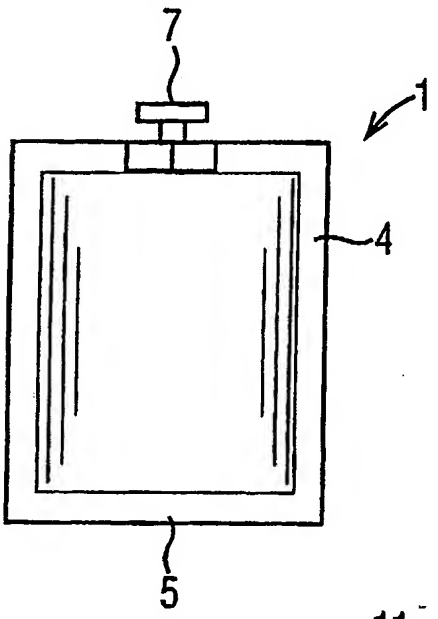
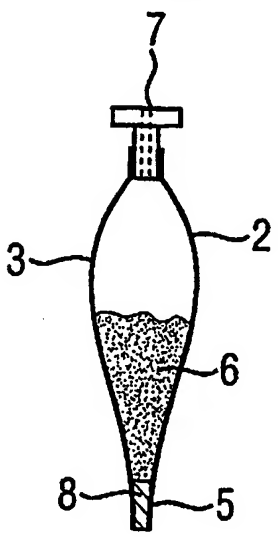


FIG. 2



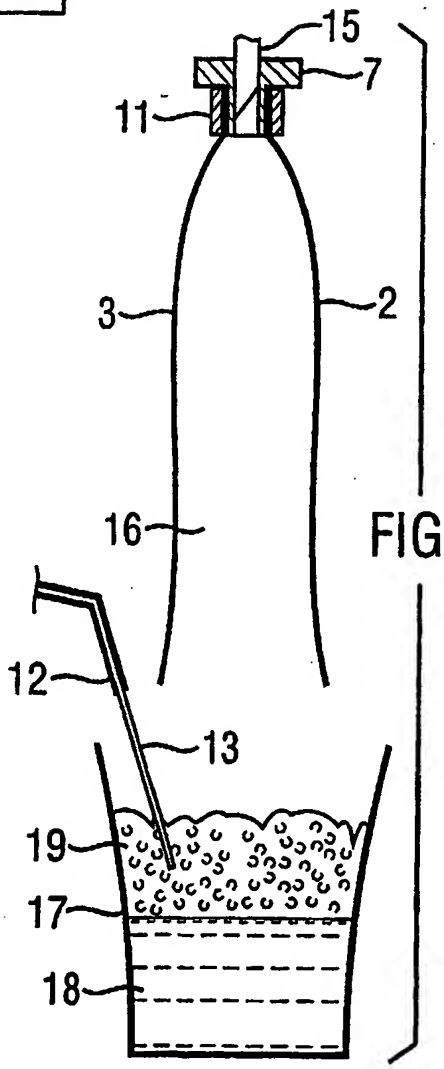


FIG. 3

PRODUCTION OF FOAMED DRINKS

The present invention relates to methods of production of foamed drinks, and in particular to the production of foamed hot drinks such as cappuccino coffee and frothy hot chocolate.

It is known to form edible foams from fresh milk, for example in milk shakes. It is also known to serve coffee and other hot beverages with a layer of hot milk foam over the liquid beverage. The hot milk foam is traditionally made by injecting steam under pressure through a hollow steam wand into cold fresh milk to heat and foam the milk. The milk foam is then poured onto liquid coffee to form the beverage, for example cappuccino or latte.

The milk foaming is normally carried out separately from the coffee brewing, because the essential oils present in coffee have a deleterious effect on foaming.

The traditional method of forming hot milk foam for cappuccino or latte does not lend itself to use in beverage vending installations. This is in part because fresh or liquid milk is difficult to handle in such installations. Furthermore, most vending installations are not equipped to supply steam under pressure. In addition, the use of a steam wand immersed in the liquid milk could present cross-contamination problems.

It is known to provide a powdered beverage whitener containing encapsulated nitrogen gas that produces a foam when it is dispersed in coffee. However, the foam does not have the same bulk and stiffness (spoonability) as a conventional cappuccino foam.

It is also known to produce a foam in a vending machine by depositing a powdered milk into a cup, followed by jetting hot water into the cup to dissolve the powdered milk and foam the milk by the action of high shear between the water jet and the milk. This suffers from the reduced consumer acceptability and mess associated with depositing a powdered milk into the cup. Furthermore, the milk powder may

not dissolve completely. In order to achieve more complete dissolution of the powder it is necessary to move the jet relative to the cup by means of an X-Y table or similar equipment, thereby increasing the cost of the apparatus.

US patent 2,977,231 describes pressurised packages containing liquid concentrates, especially for the production of milkshakes. The packages have a discharge orifice of diameter about 1.3 to 2.4 mm (0.05 inch to 0.09 inch) and are pressurized to about 500kPa (75 pounds). The resulting narrow, high speed jets achieve effective mixing and foaming through shear forces when injected into water.

US patent 3,622,354 describes packages similar to those of US 2,997,231, but with the viscosity of the liquid concentrate in the package controlled so as to enable satisfactory mixing and foaming to be achieved with a nozzle diameter of about 3 mm. This enables the package to be dispensed more quickly.

EP-A-0885154 describes a dispensing device for the preparation of a foamy beverage. The device contains a milk concentrate and is pressurised to 900-1000 kPa (9-10 bar) with an orifice diameter of at most 1 mm. The resulting very high speed jet of the concentrate gives effective mixing and foaming of the concentrate when it is injected into a liquid beverage.

It is an object of the present invention to provide methods of production of foamy beverages that are suitable for use in vending installations, such as automated vending machines.

It is a further object of the present invention to provide methods of producing foamy beverages that give stiff, stable foams comparable to those obtained by the traditional steam wand methods.

It is a further object of the present invention to provide brewing apparatus for use in the claimed methods, and foamy beverage producing systems, that are hygienic, preferably with minimal cross-contamination between brews.

It is a further object of the present invention to provide foamy beverage producing methods that require minimal adaptation of existing beverage vending equipment, and in particular avoid the need for high pressures or steam injection.

It is a further object of the present invention to provide foamy beverage producing methods that that can be used in conjunction with existing beverage brewing ingredient pack formats, or with minimal adaptation of such formats.

In a first aspect, the present invention provides a method for the preparation of a foamed drink comprising the steps of: providing a capsule containing a foamable ingredient and having an outlet for allowing fluid to escape from the capsule; providing a receptacle positioned to collect fluid escaping from the capsule through the outlet; injecting aqueous liquid into the capsule to mix with the foamable ingredient; allowing the foamable ingredient mixed with the aqueous liquid to escape through the outlet into the receptacle; followed by injecting further aqueous liquid into the receptacle through a jet having a jet diameter of from about 0.5 to about 2 mm to produce a foamed liquid in the receptacle.

The foamable ingredient is any food-acceptable substance that will form a foam on high shear mixing with water. The foamable ingredient is usually at least partially dehydrated for ease of handling and maximum storage stability. Typically the foamable ingredient comprises a partially or completely dehydrated dairy or non-dairy beverage whitened such as milk. Preferably, the foamable ingredient consists essentially of a foamable dairy or non-dairy milk concentrate, for example a granulated dried milk or a spray dried milk powder, optionally fat reduced. In certain embodiments the ingredient comprises an instantised milk granulate. Various milk powders are suitable, and the fat content and other characteristics of the milk powder can be optimised for each case. The milk powder may form part of a hot chocolate drink or other beverage. In other embodiments the foamable ingredient may comprise chocolate or another beverage ingredient such as coffee.

The dry weight of the foamable ingredient may be from about 1 to about 50g, preferably from about 5 to about 15g. In other words, the amount of the ingredient in each capsule is preferably sufficient for one portion of a foamed product, e.g. one cup of a foamy beverage.

The capsule is normally disposable after one use. The capsule may comprise at least one side formed from a substantially rigid sheet material. For example, capsules having substantially cylindrical or truncated conical shapes are envisaged. More typically the capsule comprises a body formed at least in part from flexible film material, for example a tubular sachet formed on a form-fill-seal machine, or a body formed by bonding together front and back sheets of film material around the edges thereof to define a sachet. The capsule will normally be substantially air and moisture impermeable before use in order to preserve the food ingredient in a shelf stable condition. Preferably, the package is substantially shelf stable. That is to say, it may be stored at ambient temperature and atmospheric conditions for a period of at least 3 months, preferably at least one year, without significant deterioration of the contents.

In certain embodiments the internal volume of the capsule is from about 25 to about 100 cm^3. The internal volume refers to the maximum volume of the capsule when any flexible parts are fully distended. This internal volume is typically at least twice the volume of the foamable ingredient, in order to allow space for turbulent flow and mixing of the aqueous liquid with the ingredient in the capsule.

The capsule may be provided with an inlet nozzle, for example as described in EP-A-0179641 or WO-A-9905036. In certain embodiments the method may comprise injecting liquid into two or more inlets in the capsule in order to improve mixing with the foamable ingredient. The two or more inlets may be connected through a manifold to a single liquid inlet duct. At least one of the inlets may be angled to assist turbulent mixing and washing out of the capsule.

The method according to the invention initially operates by enabling, first, turbulent mixing of the liquid and the foamable ingredient in the capsule, followed by

deposition of the resulting mixture into the receptacle and jetting liquid into the mixture in the receptacle to provide foaming. The use of a capsule removes earlier problems with direct deposition of milk solids into a receptacle and provides a better quality foam in larger quantities.

In certain embodiments the outlet of the capsule is sealed by freshness barrier. The term "freshness barrier" refers to a barrier that is substantially impermeable to air or moisture so as to preserve the freshness of the foamable ingredient by preventing ingress of air or moisture through the liquid guide before brewing commences. The freshness barrier may be released by an external mechanical force or thermal field applied during brewing. The freshness barrier is preferably releasable by the action of pressure and/or hot water from inside the capsule during brewing. For example, the freshness barrier may comprise a layer of a sealant that is released by the action of heat and/or moisture, such as an adhesive as described in EP-A-0179641 or WO99/05036.

For example, in certain embodiments the capsule comprises two flexible sheets bonded together along a seam situated opposite the inlet, said bonding being releasable by the action of heat or pressure inside the capsule, whereby the two sheets peel apart under said action to provide said opening.

Preferably, where the outlet is sealed by a freshness barrier as hereinbefore described, the injection of liquid into the capsule initially causes mixing with the foamable food ingredient. The freshness barrier is then released to form said opening, thereby releasing the food ingredient into the receptacle.

Preferably, the aqueous liquid consists essentially of water, optionally mixed with steam. In certain embodiments the liquid is injected into the capsule at a pressure of from about 30 kPa (0.3 bar) to about 200kPa (2 bar). These pressures are suitable for use in vending equipment without special measures.

In certain embodiments the liquid is injected in a two stages: a first, relatively low pressure stage to achieve mixing with the foamable ingredient without bursting the

capsule, followed by a second, high pressure stage to open the outlet and release the contents into the receptacle

Preferably, the liquid is injected into the capsule containing the foamable material by a peristaltic or piston pump, preferably at an average rate of from about 250 to about 2000 ml/min and more preferably from about 500 to 1500 ml/min. The liquid may be injected in intermittent or pulsed fashion to optimise the amount of foam or the organoleptic properties of the product. Preferably, the method further comprises the step of injecting air into the capsule after injecting the liquid to expel residual liquid from the capsule.

In certain embodiments the total amount of liquid injected into the capsule containing the foamable material is from about 25 ml to about 100ml. For a hot foamed beverage the temperature of the liquid is typically from about 75 to about 100 degrees C.

The step of injecting liquid into the capsule containing the foamable material is followed by the step of injecting a jet of liquid into the receptacle containing the liquid/foamable ingredient mixture. The high velocity and narrow diameter of the liquid jet provide strong shear forces that give rise to the formation of a thick foam.

The jet is normally formed by pumping liquid into a narrow-bore jet-forming inlet. The inlet may be situated adjacent to the capsule containing the foamable material. Alternatively, the inlet may be moved into the place of the capsule following ejection of the capsule from the beverage brewer. The internal cross-section of the jet-forming inlet is normally a regular shape, and preferably it is substantially cylindrical. Preferably, a circular water jet is produced having a diameter of from about 0.5 to about 2 mm, preferably from about 0.7 to about 1.5 mm. Since water is substantially incompressible and not significantly viscoelastic, it follows that the internal cross sectional area of the jet-forming region of the inlet and/or the outlet is generally from about 0.2 to about 3 mm^2, preferably from about 0.4 to about 2 mm^2, for example about 1 mm^2.

If the narrow bore, jet forming region of the inlet is too short, then the inlet tends to form a spray rather than a jet. If the narrow bore is too long, then the pressure drop across the inlet may be too high. Accordingly, the narrow bore region preferably extends for a distance of from about 1 to about 5 mm, preferably about 2 to about 4 mm along the direction of liquid flow.

Typically, the jet velocity of the liquid jet is from about 3 to about 50 m/s, preferably from about 5 to about 15 m/s. This gives sufficient shear on impact with a liquid body in the receptacle to provide effective foaming. The temperature of the liquid is preferably from about 80 to about 100°C. The liquid is preferably supplied to the inlet at a pressure of from about 0.4 to about 2 bar (40 to 200 kPa), preferably about 0.8 to about 1.2 bar (80 to 120 kPa) which is achievable with conventional vending equipment. The flow rate per jet is preferably from about 4 to about 40 ml/sec, preferably from about 6 to about 18 ml/sec. A plurality of jets may be provided to speed up the rate of liquid addition and foam formation. Preferably, at least one liquid jet is inclined at an angle to the vertical in order to achieve swirling of the liquid in the receptacle. Preferably, the total amount of liquid jetted into the receptacle is from about 30 to about 150 ml, more preferably from about 50 to about 100 ml.

The receptacle is typically a cup, for example a polystyrene cup. Typically, the bottom of the receptacle is located from 5 to 25cm below the outlet of the capsule.

It is occasionally found that the method described above produces a foam having undesirable large bubbles near the top. In such cases the method preferably further comprises the step of applying a water spray to the top of the foam in the receptacle after the step of water injection. The water spray disperses the larger bubbles. Typically the water spray is applied for 1 to 5 seconds and has a small droplet size.

The method of the invention normally comprises the step of holding the capsule in a beverage brewer before the step of injecting liquid into the capsule. Preferably, the method further comprises the step of mechanical ejection of the capsule from

the holder after the step of injecting liquid into the capsule. For example, the beverage brewer may comprise a waste bin into which the capsule is automatically and mechanically discarded. Preferably this takes place before or during the step of injecting further liquid.

The present invention is especially well suited for preparing foamed beverages in conjunction with known brewing steps in known vending machines. For example preferred methods according to the invention further comprise the steps of: providing a second capsule containing a beverage brewing ingredient and having an outlet for allowing fluid to escape from the capsule; injecting water into the second capsule to brew a beverage inside the capsule; and allowing the beverage to escape through the outlet into the receptacle.

Preferably, the step of brewing a beverage is carried out after the steps of producing an edible foamed liquid, and the beverage escapes through the outlet into the edible foamed liquid in the receptacle. This enables drinks such as cappuccino to be made by brewing a coffee capsule immediately after the preparation of the foamy liquid in accordance with the invention, thereby avoiding the deleterious effect of coffee oils on the milk foaming.

In such methods the capsule containing a foamable ingredient and the second capsule containing a beverage brewing ingredient may be sequentially held in, and mechanically ejected from, the same capsule holder in the same brewing apparatus during the method.

Typically, the beverage brewing ingredient comprises ground coffee or leaf tea, preferably in an amount suitable to brew a single cup of beverage. For example, from about 2g to about 12g of ground coffee or from about 1g to about 9g of leaf tea. It will be appreciated that the construction of the capsule containing a beverage brewing ingredient will normally be substantially similar to the construction of the capsule containing a foamable food ingredient. It is a particular advantage of the present invention that the capsules can be manufactured and filled on the same equipment, and can be fed sequentially into the same capsule

holding, brewing and manipulating mechanism. The beverage brewing capsule may additionally comprise a filter element, such as a filter paper bonded to an interior surface thereof.

The liquid may be injected into the capsule containing the beverage brewing ingredient in amounts, at pressures, and at temperatures similar to those described above in relation to the capsule containing the foamable ingredient. In other embodiments the liquid is injected into the capsule containing the beverage brewing ingredient at pressures of from about 200 kPa to about 2 MPa (about 2 to about 20 bar), preferably from about 200 kPa to about 1 Mpa (about 2 to about 10 bar). These pressures are conventionally generated for brewing espresso coffee. Preferably, the liquid injected in this stage of the process consists essentially of water.

Preferably the total amount of liquid injected in the process according to the present invention is from 100 to 400 ml. Preferably the product comprises from about 10% to about 50% of foam by volume, more preferably from about 20% to about 35% foam by volume.

In a second aspect the present invention provides a beverage brewer for preparing a foamed liquid by a method according to the present invention, comprising: a capsule holder adapted to receive a capsule containing a foamable ingredient; a first pump for supplying liquid under pressure; a liquid injection tube connected to said first pump for injecting liquid into the capsule; and a separate liquid jet outlet for producing a liquid jet having a diameter of from about 0.5 to about 2 mm.

In certain embodiments the first pump may be used to supply liquid to both the capsule injector and to the liquid jet outlet. More usually a second pump is provided for supplying liquid to the liquid jet . The liquid preferably consists essentially of water.

The beverage brewer preferably further comprises a mechanical ejection means for ejecting capsules from the holder after water injection is complete.

Preferably, the apparatus further comprises a mechanism operatively associated with the holder to retract the injection tube or tubes when the holder is opened.

The liquid jet outlet is preferably directed downwardly at a small angle to the vertical in order to swirl the beverage being foamed.

In a third aspect the present invention provides a beverage brewing system comprising: a beverage brewer according to the present invention; a capsule containing a foamable ingredient and adapted to be received in the holder of the beverage brewer; and a second capsule containing a beverage brewing ingredient and also adapted to be received in the holder of the beverage brewer.

Preferably, the beverage brewing system is programmed to carry out the following steps in response to a signal to brew a foamed beverage: opening the capsule holder to receive the capsule containing a foamable ingredient; securing said capsule in the holder; followed by injecting liquid into the capsule containing the foamable ingredient; followed by ejecting the capsule from the holder; opening the holder to receive the second capsule containing a beverage brewing ingredient; securing said capsule in the holder; injecting liquid into the receptacle in a jet having a diameter of from about 0.5 to about 2 mm; followed by injecting liquid into the capsule containing the beverage brewing ingredient to brew a beverage, and allowing the beverage to escape into the receptacle; followed by ejecting the capsule containing the beverage brewing ingredient from the holder.

In certain embodiments the capsules used in the systems of the present invention may comprise machine readable pack recognition means on the capsule to assist use of the capsule in fully automated vending equipment. For example, the capsules may comprise machine readable projections or perforations or a bar code. In these embodiments the brewer comprises compatible machine recognition capabilities to recognise and manipulate the capsules.

Specific embodiments of the present invention will now be described further, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 shows a plan view of a capsule containing a foamable ingredient for use in the methods according to the present invention;

Figure 2 shows a longitudinal sectional view through the capsule of Figure 1; and

Figure 3 shows the capsule of Figures 1 and 2 after injection of liquid into the capsule has been completed, and while further injection of a jet of liquid into a receptacle is taking place.

Referring to Figures 1 and 2, the capsule 1 is in the form of a sachet formed from two sheets of laminated, metallised flexible plastic film 2,3 bonded together around a margin 4. A lower margin 5 of the sachet is bonded by means of a layer of adhesive 8 that can be released by the action of hot water inside the sachet. In a top margin of the sachet a nozzle 7 is inserted between the sheets 2,3 and bonded thereto in air tight fashion. The capsule has an internal volume of approximately $50cm^3$ when fully distended. Thus far the construction of the package 1 is similar to the beverage brewing sachets described in EP-A-0179641 or WO99/05036. The capsule is approximately half filled with approximately 5-10g of a foamable powdered milk 6.

The nozzle 7 is formed by injection moulding of a thermoplastic material such as polypropylene. It is bonded by adhesive or melt bonding in air tight fashion to the front and back sheets 2, 3 of the sachet. The nozzle 7 comprises a bore region having an internal diameter of approximately 3mm, into which a water injection tube 15 is inserted in use. A flange is provided at the top of the nozzle to assist mechanical gripping and manipulation of the sachet in the brewing apparatus. Finally, a plastics laminated foil freshness barrier (not shown) is sealed over the top of the nozzle. This results in a fully air tight and moisture-tight package that is shelf stable.

With reference to Figure 3, in use the capsule 1 is held in a beverage brewer by capsule holder 11 which grips the capsule below the nozzle flange. A water inlet tube 15 is advanced to pierce the freshness barrier in the nozzle 7, and hot water at about 90°C is then injected through the tube 15 into the capsule 1. The hot

water undergoes turbulent mixing with the powdered milk 6 in the capsule 1 to product an aqueous dispersion of the powdered milk. The hot water also releases the seal 8 at the bottom of the capsule, thereby allowing the aqueous milk dispersion to drop into the receptacle 17. The total amount of water injected in this stage is about 50 ml.

Once water injection into the capsule 1 is complete, the beverage brewer automatically jettisons the used capsule into a waste receptacle. Simultaneously or sequentially, a jet of water 13 is pumped into the liquid mixture in the receptacle 17 through jet inlet 12. The jet diameter is about 1 mm, the jet velocity is about 5 m/s and the amount of water injected through the jet is about 60 ml. The jet of water causes foaming of the mixture in the receptacle 17 to produce a foamed liquid comprising a liquid layer 18 and a foam layer 19.

The resulting foamed milky liquid requires the addition of a beverage flavour to render it more palatable. In accordance with the present invention a beverage brewing capsule is inserted into the same holder in the beverage brewer. The beverage brewing capsule is constructed in similar fashion to the capsule of Fig. 1, but is filled with ground coffee and incorporates a filter element. The beverage is brewed by injection of hot water into the nozzle of the capsule in similar fashion as for the milk-containing capsule. The brewed coffee escapes from the bottom of the capsule and drops through the foam layer 19 into the liquid layer 18 in the receptacle 17. A final jet of water may be briefly injected through nozzle 12 to swirl the contents of the receptacle 17 and thereby mix the brewed beverage with the milky liquid already in the receptacle. The spent beverage brewing sachet is then automatically discarded by the brewer.

The method according to the present invention may be carried out in either semi-automatic or fully-automatic fashion by beverage vending equipment. In the semi-automatic embodiment, the process is initiated by a user selecting a foamed beverage option from the vending equipment. The system signals the user to insert a milk powder capsule, for example by opening a door leading to a beverage brewing enclosure equipped with the capsule holder. The machine then

automatically grips the capsule, and injects water into the capsule for a predetermined time to achieve the initial mixing and to deposit the water and milk powder mixture into the receptacle. The machine then automatically injects further water into the receptacle in a high velocity jet to achieve the desired hot foamed milk in the receptacle. The machine also automatically discards the spent capsule, either before or after the step of jetting. An advantage of discarding the capsule before the step of the jetting is that it allows the water jet nozzle to take the place of the capsule in the brewing cavity.

In the semi-automatic mode, the machine then signals to the user to insert a beverage brewing capsule. The user can select the desired beverage capsule, insert it into the same holder in the machine, whereupon the machine automatically injects water into the capsule to brew the beverage inside the capsule and to release the barrier at the bottom of the capsule to release the beverage into the receptacle. Finally, the machine automatically discards the spent brewing beverage capsule and "finishes" the foamed beverage by a brief water jet injection to swirl the beverage, and a brief water spray over the foam to remove any large bubbles on the surface of the foam.

In the fully automatic embodiments, the milk powder capsules and beverage brewing capsules are stocked inside the vending machine, and the machine additionally selects the appropriate sachets and feeds them to the sachet holder at the appropriate times in response to the initial beverage brewing instruction from the user.

The above embodiments have been described by way of example only. Many other embodiments falling within the scope of the accompanying claims will be apparent to the skilled reader.

CLAIMS

1. A method for the preparation of a foamed drink comprising the steps of:

providing a capsule containing a foamable ingredient and having an outlet for allowing fluid to escape from the capsule;

providing a receptacle positioned to collect fluid escaping from the capsule through the outlet;

injecting liquid into the capsule to mix with the foamable ingredient;

allowing the foamable ingredient mixed with the liquid to escape through the outlet into the receptacle; followed by

injecting further liquid into the receptacle through a jet having a jet diameter of from about 0.5 to about 2 mm to produce foamed liquid in the receptacle.

2. A method according to claim 1 wherein the foamable ingredient comprises a partially or completely dehydrated dairy or non-dairy beverage whitener.

3. A method according to any preceding claim, wherein the dry weight of the foamable ingredient is from about 5 to about 50g.

4. A method according to any preceding claim wherein the foamable ingredient comprises a dehydrated milk.

5. A method according to claim 4, wherein the foamable ingredient consists essentially of a foamable milk powder.

6. A method according to any preceding claim, wherein the capsule comprises a body formed from flexible film material.

7. A method according to any preceding claim wherein the outlet is sealed by a freshness barrier that can be released by the action of water, heat or pressure from inside the capsule.

8. A method according to any preceding claim, wherein the diameter of the jet is from about 0.7 to about 1.5 mm

9. A method according to any preceding claim, wherein the capsule is provided with an inlet nozzle through which the liquid is injected.

10. A method according to any preceding claim, wherein the fully distended internal volume of the capsule is from about 25 to about 100 cm^3.

11. A method according to any preceding claim, wherein the liquid is injected into the capsule at a pressure of from about 30 kPa (0.3 bar) to about 200 kPa (2 bar).

12. A method according to any preceding claim, wherein the liquid is injected into the capsule at a temperature of from 80 to 100 degrees C.

13. A method according to any preceding claim, wherein the total amount of liquid injected into the capsule is from about 25 ml to about 100 ml.

14. A method according to any preceding claim, wherein the jet velocity of the liquid jet is from 5 to 50 m/s.

15. A method according to any preceding claim, wherein the total amount of liquid injected in the liquid jet is from about 25 to about 100 ml.

16. A method according to any preceding claim, wherein the temperature of the liquid supplied to the jet is from about 80 to about 100°C.

17. A method according to any preceding claim, wherein the pressure of the liquid supplied to the jet is from about 30 kPa (0.3 bar) to about 200 kPa (2 bar).

18. A method according to any preceding claim, wherein the jet is directed at an angle to the vertical to swirl the liquid in the receptacle.

19. A method according to any preceding claim, wherein the bottom of the receptacle is located from 5 to 25cm below the bottom of the capsule outlet.

20. A method according to any preceding claim, further comprising the step of applying a water spray to the top of the foamed liquid in the receptacle after said step of injecting further water is completed.

21. A method according to any preceding claim, further comprising the step of gripping the capsule in a holder before the step of injecting water into the capsule.

22. A method according to claim 21, further comprising the step of mechanical ejection of the capsule from the holder after the step of injecting water into the capsule and before the step of injecting further water.

23. A method according to any preceding claim, further comprising the steps of:

providing a second capsule containing a beverage brewing ingredient and having an outlet for allowing fluid to escape from the capsule;

injecting liquid into the second capsule to brew a beverage inside the capsule; and

allowing the beverage to escape through the outlet into the receptacle.

24. A method according to claim 23, wherein the said steps of injecting liquid into the second capsule is carried out after the steps of producing an edible foamed liquid, and the beverage is added to the edible foamed liquid in the receptacle.

25. A method according to claim 23 or 24, wherein the capsule containing a foamable food ingredient and the second capsule containing a beverage brewing ingredient are sequentially held in, and mechanically ejected from, the same holder during said method.

26. A method according to claim 24, 25, or 26, wherein the beverage brewing ingredient comprises ground coffee or leaf tea.

27. A beverage brewer for preparing an edible foamed liquid by a method according to any preceding claim, comprising:

a capsule holder adapted to receive a capsule containing a foamable ingredient;

a first pump for supplying liquid under pressure;

a liquid injection tube connected to said first pump for injecting the liquid into the capsule; and

a jet nozzle for producing a liquid jet having a diameter of from 0.5 to 2 mm.

28. A beverage brewer according to claim 27, further comprising a second pump for supplying liquid to the liquid jet nozzle.

29. A beverage brewer according to claim 27 or 28, further comprising a mechanical ejection means for ejecting the capsule from the holder.

30. A beverage brewing system comprising:

a beverage brewer according to claim 26;

a capsule containing a foamable ingredient and adapted to be received in the holder of the beverage brewer; and

a second capsule containing a beverage brewing ingredient and adapted to be received in the holder of the beverage brewer.

31. A beverage brewing system according to claim 30, when programmed to carry out the following steps in response to a signal to brew a foamed beverage:

opening the clamp to receive the capsule containing a foamable food ingredient; securing said capsule in the holder; followed by

injecting liquid into the capsule containing a foamable ingredient; followed by

ejecting the capsule from the holder

opening the clamp to receive the capsule containing a beverage brewing ingredient; securing the second capsule in the holder;

injecting liquid into the receptacle in a jet having a diameter of from about 0.5 to about 2 mm; followed by

injecting liquid into the second capsule containing the beverage brewing ingredient; followed by

ejecting the capsule containing the beverage brewing ingredient from the clamp.